July 1995

A Summary of Incinerators Operating in the Denver Area

Introduction

At the May HAP meeting, several people asked how potential emissions from the incinerators at the RFP compare to those from other incinerators in the Denver area. In an initial preliminary attempt to answer this question without expending a great deal of time and resources, a list of incinerators applying for air pollution permits from the Colorado Department of Public Health and Environment (CDPHE), and information on incinerators which have operated at the Rocky Mountain Arsenal was reviewed and is summarized in this memo. Although emission estimates for these incinerators are not readily available, comparison of the capacity and design of the incinerators may be helpful.

Incinerators listed by CDH

Table 1 ahows permitted throughput limits for eight incinerators currently operating in the Denver area. These could burn a combined total of about 762 tons or 6.8×10^5 kg/year of municipal, hospital and other waste. For comparison, the maximum bounding estimate of throughput for the incinerator in Building 771 at the RFP was 3.9×10^5 kg/year.

Table 1. Incinerator Type and Capacity Information from the Colorado Department of Public Health and Environment's Air Pollution Emission Notices (APENs).

NAME/LOCATION	Type of Incinerator	Design Rate Limit	Annual Limit Throughput	Date
Adams County Animal Control Center	Natural Gas Fired	200 lbs/hour	57.2 tons	1988
OEA, Inc., Aurora	Schmidt, LP gas Fired	1 lb/hour	270 lbs	1990
St. Vrain Crematory, Longmont	Gas Fired			1991
Boulder County Humane Society	Natural Gas Fired	150 lbs/hour	219 tons	1993
Colorado Serum Company, Denver	SP-100X2	100 lbs/hour	20 tons	
Jonas Brothers, Inc. Denver	Schmidt, Gas Fired	80 lbs/hour	6 tons	1987
Veterans Administration Medical Center	Kelly Natural Gas Fired	350 lbs/hour	10,400 lbs	1988
Denver International Airport	Gas fired	475 lbs/hour	455 tons	1994

In addition, 72 incinerators are in the CDPHE database as having once applied for permits from CDPHE. CDPHE began the permitting process in 1972, so incinerators operating before 1972 were not listed. Those listed include 11 incinerators associated with businesses, such as the Coors Container Company, the USDA, Fagan Iron and Metal, IBM, and Syntex Chemical. Also listed are 39 schools, approximately 8 animal care centers, veterinary clinics, or humane society facilities, 4 hospitals, 2 crematoriums, one hotel and both the Stapelton and Denver International Airports.

With the exception of the incinerator at the Rocky Mountain Arsenal, described below, no large municipal or industrial incinerators have operated in the Denver area. The incinerators that have operated in the past in the Denver area are of the type described in Table 1 and it is likely that the amount of material incinerated per year was below the total amount permitted for the incinerators in Table 1.

Incinerators at the Rocky Mountain Arsenal

The Rocky Mountain Arsenal, a 27 square mile area 10 miles NE of downtown Denver, was established in 1942. The US Army manufactured chemical weapons there until the 1960s, then destroyed weapons through the early 1980s. Since W.W.II, private companies have leased facilities at the Arsenal. These companies produced pesticides and herbicides up until 1982. Now the Arsenal is a Superfund Site and the primary mission is cleanup. The contaminants of concern in soil and groundwater are pesticides, heavy metals and volatile organics.

One of the primary cleanup operations involves an incinerator designed to destroy hazardous liquids. The incinerator, called the Submerged Quench Incinerator (SQI), is the largest incinerator in the Denver area.

The SQI is a natural gas flame incinerator designed to burn liquid with a high salt content. It operates at a high temperature (1800-1900°F) and is designed to have a 99.99% destruction capability for organics. The offgases pass through a venturi scrubber and a wet scrubber. Molten salts that remain after combustion are cooled in a quench tank of circulating water. The brine is then shipped to an off-site facility where metals are removed.

Before 1956, liquid wastes were discharged to a series of unlined basins (a common disposal practice at that time), called A,B,C,D and E. In 1955, after complaints about contaminated ground water, a 93 acre, 243 million gallon capacity asphalt-lined waste holding and evaporation pond, called Basin F, was built. All the liquids from the other basins were pumped into Basin F and the sewer system was modified to dump into Basin F. From 1957 to 1988, all liquid waste was discharged into Basin F. In 1988, cleanup of Basin F began by pumping the liquid into three above-ground metal tanks and a lined holding pond and removing contaminated sludge and soil.

The SQI was chosen from 40 different technologies as the most effective method to dispose of the Basin F liquids. In conjunction with the EPA and CDH, the Army conducted two test burns and did a human health risk assessment which estimated there might be one additional cancer for 20 million people (2×10^{-7} excess cancer risk) for someone who lived at the site boundary and ate their food from that area.

The SQI facility started operating in June of 1993 and burned up to 1000 gallons of Basin F liquid per hour. As of June, 1995, over 11.2 million gallons of basin F liquid had been processed through the SQI. The facility stopped burning in July of 1995 and is now up for sale. A

volume of 11.2 million gallons is approximately 42 million or 4.2×10^7 kg of total liquid burned or about 2.1×10^7 kg/year, which is about 50 times the maximum bounding value of 3.9×10^5 kg used for the yearly throughput of the incinerator in Building 771 at the RFP.

A very preliminary search of the historical database at the Arsenal, called *the History of the Rocky Mountain Arsenal*, identified several other incinerators at the site. The total throughput for these units is in most cases unknown or classified as restricted information. It is likely that there were more small refuse incinerators that are not entered into the database and for which documentation no longer exists.

Both Buildings 1611 and 1606 at the Arsenal had two incinerators, a deactivation furnace and a decontamination furnace. The deactivation furnaces were used to burn materials and the decontamination furnaces were used to decontaminate metal parts. The decontamination process, called '5Xing of metal parts', involved heating metal materials to 2000'F for 20 minutes to destroy all organic contaminants on them. The deactivation furnace in Building 1611 was used in the mid-1970s to burn propellants, fuses and detonators, and then in the early 1980s to burn chemical identification kits, DDT-contaminated materials and riot control agents. An afterburner was added to the deactivation furnace to control mustard and lewisite vapors in the early 1980 burnings. The decontamination furnace was used to decontaminate components of nerve agent warheads. The furnaces in Building 1606 were used from 1973 to 1976 for M34 GB cluster bombs.

Three furnaces were used in Building 536/537 from 1971 to 1973 to destroy mustard gas and other materials, from 1974 to 1976 to decontaminate metal parts associated with GB Nerve agent, and from 1977-1979 to decontaminate metal parts and containers associated with phosgene.

Building 742-A had a furnace that was used from 1967 to 1970 to destroy TX project wheat rust stocks.

Conclusions

Based on the limited amount of information presented here, 2.2×10^7 kg/year of material could have been incinerated each year in the Denver area from June 1993 through July 1995. An estimate of 8×10^5 kg per year seems reasonable for the amount of waste burned in the area before the SQI facility operated. The estimates of throughput for the incinerator in Building 771 at the RFP range from 3×10^4 kg in the early years to 3.9×10^5 kg/year.

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The Rocky Flats Nuclear Weapons Plant Dose Reconstruction and Risk Characterization Project

Phase II: Toxicity Assessment and Risk Characterization

Interviews: Status And Projections

Terrol F. Winsor, Ph.D.
August 1995

INTRODUCTION

As part of its analysis of information sources for the Rocky Flats Dose Reconstruction project, *RAC* team members have talked to hundreds of people. Many of these have supplied extremely useful additional information on topics such as work at the 903 oil barrel storage area. Often, it has been necessary to contact up to 20 persons for information on a particular topic such as weather during the 1957 or 1969 fires. Short discussions, or contacts about a specific brief question are not thought of as interviews. Some discussions have been somewhat formal and lengthy, and these we have generally classed as interviews. Some people have been interviewed more than once. The focus of these interviews was usually to trace or identify process and monitoring data from early years of operation. We have frequently used these interviews in search of leads to previously unnoticed or unreported environmental releases.

A great many sources have provided information on past and present monitoring, and research activities; as well as insight on offsite impacts and internal workings of the Rocky Flats Plant (RFP). The following list denotes some of those who have helped in this search.

1. Current RFP employees
2. Past RFP employees
3. Non-affiliated scientific researchers of RFP questions
4. Interested citizens
5. Citizen groups such as the Environmental Information Network
6. City and County Health/Science personnel
7. Colorado Department of Public Health and Environment personnel
8. Citizens Environmental Sampling Committee members

DEVELOPMENT OF ANONYMITY POLICY AND THE INTERVIEW DATABASE

Soon after *RAC* began the process of interviewing people, but especially in mid-1994, we realized the difficulty of gaining access to those who would be concerned about breach of identity. In response to that concern, the Health Advisory Panel formulated a policy on interviews. A copy of this policy is attached. It addresses confidentiality, treatment of interview notes and documents provided by the interviewee, and treatment of sensitive or classified information. The HAP interview policy has since been used, and has proved beneficial in soliciting additional interviews with RFP and non-RFP individuals. In fact, a number of people stated that they would not have met with us but for the policy.

Concurrently with the development of the HAP policy, the RFP DOE manager released a statement in support of the Dose Reconstruction Project, and called on workers to feel free about providing interviews for this project. The DOE statement also provided access to a number of current RFP employees.

Our typical pattern has been to meet with an interviewee, gain his approval of the notes (and decision as to anonymity), and consult with a RFP classifier as to whether any part of the notes are classified or sensitive.

Interview records have been entered into an interview database (FoxPro format). Currently, we have entered notes from about 45 interviews. These include interviews with a broad range of people beyond current and former RFP workers. These database records include nine people who requested anonymity. There remain several note sets which await approval of the person interviewed, or approval of the classification officer before insertion into the database. Most of the workers who came forth in response to the DOE solicitation requested anonymity, and most were primarily concerned about worker health and safety. However, some of these workers also provided important information about the major fires or the 903 oil barrel storage area. The following topics were most often discussed with people who either were or were not connected with RFP.

- 903 oil barrel storage area
- 1957 fire and weather conditions
- 1969 fire and weather conditions
- Radionuclides in soils, and resuspension
- Beryllium
- Worker health and safety, especially as regards chemicals and beryllium
- Archived environmental media
- Radionuclides in water
- Sources of important documents, especially those that have disappeared
- Proposed additional research or monitoring

In addition to these most frequently discussed items, we also have obtained information about dioxins, environmental contaminants released from nearby sources, and locations of environmental sampling not previously well documented.

SUMMARY OF INTERVIEWS OF CURRENT OR FORMER RFP PERSONNEL

The following are those current or former RFP personnel who have been interviewed and are listed in the database:

1. Carol Barker-discussions concerning the 903 storage area
2. Chuck Barrick-provided a description of weather during 1957 fire
3. Dale Bokowski-discussions concerning laboratory analysis in 1960-1975
4. Brent Bowen-provided information on historical weather
5. John Carruso-discussed chemical operations
6. Mel Di Lorenzo-discussions concerning the 903 storage area
7. Grant Euler-interview about needs for research on resuspension
8. Rich Johnston-described beryllium work
9. Gerhard Langer-two interviews about the 903 storage area and dust resuspension
10. John Lee-described chemical recovery operations and the 1969 fire

11. Larry Lee-discussed chemical work
12. Iggy Litaor-four interviews about soils studies
13. Conrad Trice-discussions about possible source of archived environmental samples
14. Jim Whiting-discussions about the establishment of plutonium background in soils
15. Kevin Wilson-discussed work with plutonium, other metals and chemicals

In addition to the above listing, there were nine individuals who requested anonymity and whose notes are in the database.

1. First anonymous-discussed beryllium safety for workers
2. Second anonymous-discussed the 1957 fire and the 903 storage area
3. Third anonymous-discussed chemical worker safety
4. Fourth anonymous-suffered a personal beryllium exposure
5. Fifth anonymous-interview about plutonium and beryllium safety in plant
6. Sixth anonymous-provided information on the 1969 fire
7. Seventh anonymous-worked in monitoring from 1975 to 1990
8. Eighth anonymous-concerned with beryllium safety for workers
9. Ninth anonymous-described a variety of waste streams, including uranium and thorium

Another six people have yet to decide on use of their names with the interview notes. These notes have not yet been entered into the database. The topics of discussion included the 1957 fire, general monitoring at the plant, soils data and the location of archived soil samples, and worker health and safety.

There were also over 20 people who were contacted for some specific purpose, but these were not considered to be interviews.

Notes of other brief discussions or contacts that provided useful information, but were not entered into the FoxPro database, are kept in notebooks of *RAC* personnel.

PROSPECTS FOR ADDITIONAL INTERVIEWS

Very often, as the project progresses, we discover new names of potential interviewees that had not previously been contacted. Also, we may learn of the need to talk to additional people as we gain a better understanding of gaps in our knowledge. In addition to these people, we may not have had the opportunity to interview some considered important from the very beginning.

We have identified needs that remain to be addressed through the interview process. Those issues of greatest interest are:

- 1957 fire: There remain four people who, we believe, could provide important information on the fire. These are John Hill, Ralph Haynes, Ken Freiburg and Merlin Boss. At least one of these has previously refused an interview, and names of two of the others have only recently surfaced in this connection. We believe at least two of these will meet with us. A fifth, Jess Cleveland, has agreed to an interview.

- Chemrisk suggested follow-up talks with several people they had interviewed during Phase I. We have talked again to four of these. Also, we have contacted Larry Crisler (chemical recovery), Rod Hoffman (instruments), Bill Osbourne (air

effluents) and Bill Tyree (instruments) for interviews. Since they submitted to interviews previously, we are encouraged that they will address follow-up questions.

- At the May 1995 HAP meeting, the Environmental Information Network requested that greater attention be given to contacting several persons who they suggested may be knowledgeable about various areas of the RFP. We have since interviewed two of these, one being Tom Courtney, and have arranged to speak with a third. We are aware of five more individuals who should be contacted, several residing out of state. We were specifically requested to follow up in talks with those who were actually on Rocky Flats Plant site during the 1957 fire. We have interviewed one of the 1957 fire veterans, and may receive some help with more from the Steelworkers Union (see below). We do not yet feel it is appropriate to release the names of these potential interviewees.

- 903 oil barrel storage area: There remain four retirees to meet, who actually worked at the area during the barrel removal. To date, these people have not desired to discuss the 903 pad barrel removal, and do not wish their names be released. One however, suggested that he may be persuaded to cover the topic in a group meeting. We will pursue this possibility. There are also Bruce Owen (health physiciat) and Loren Crow (potential source of weather information) who may have knowledge of the activities at this site.

- Jerry Harden, President of the Rocky Flats Local of the United Steelworkers of America, has agreed to assist in the arrangement of meetings with retired union members. This may produce a number of retirees, whose experience spans a wide range of areas and activities at the RFP.

Hypothetical Exposure Assessment Using On-Site Air Monitoring Data

(What's in an Average?)

At previous Health Advisory Panel meetings for the Rocky Flats Historical Public Exposure Studies, concern has been raised about the use of averages of environmental measurements made around the site. We (*RAC* researchers) also shy away from using the site's published averages for a number of reasons, preferring to reconstruct our own averages, as appropriate, from the raw data where they are available. However, one of the concerns appears to be that an exposure assessment based on averages is invalid. That is, that high values, when "masked" by the averaging process, are somehow not being considered.

It is important to separate the concerns about exposure assessment from other concerns relating to the use of averages. This handout provides an example exposure assessment based on the daily measurements of long-lived alpha radioactivity at the S-8 sampler near the 903 area. This hypothetical assessment assumes that a man was at the location of the sampler continuously throughout 1965 through 1971. The plots below contain the last quarter of 1964 as well, but the 1964 data are not used in the exposure assessment calculations which follow.

Less than one percent of the days had a missing or invalid measurement. The daily data are plotted in Figure 1, with all zero values omitted from this semi-logarithmic plot. In fact, zero is the mode (most frequent value) of this data set. The filters were only counted for 10 minutes during most of this time, resulting in rather poor sensitivity. The plant's quoted detection limit for an alpha measurement in air from a 10-min count was 0.21 cpm (5.5 fCi m^{-3}).

Figures 2 and 3 illustrate the monthly and annual averages, computed from the daily data, and plotted on the same scale. Visually, the averages do appear to "mask" the high values, as one would expect.

Exposure assessment calculation:

The basic formula for intake from inhalation of the airborne alpha activity is:

Integrated air concentration (fCi-time m^{-3}) × Inhalation rate (m^{-3} inhaled per unit time) × 10^{-6} nCi per fCi = nCi activity inhaled

For this example calculation, the inhalation rate used is that for a standard man (22.8 m^3 air per day). The daily data have been compiled into an EXCEL spreadsheet format and that software was used to compute the averages, treating the infrequent missing data as zeros. The integrated air concentration is computed by summing the concentration for each time increment over the entire interval January 1, 1965 through December 31, 1971.

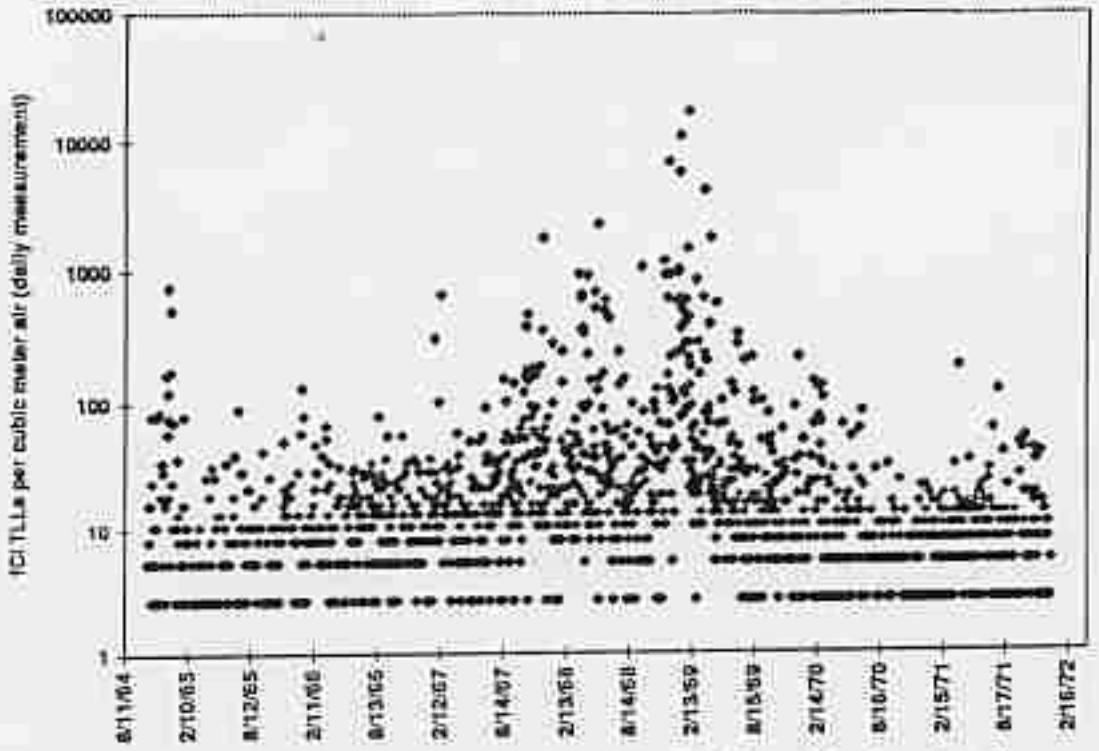

Figure 1. Daily measurements of total long-lived alpha activity in air at the S-8 sampler near the 903 area. The concentration in femtocuries per cubic meter was obtained by dividing the net cpm by 0.038 (see Rope et al. in prep.). Zero values were omitted from the semi-logarithmic plot, although a net cpm of zero was the mode (most frequently observed measurement) in this and all other onsite air datasets. The integrated air concentration from summing the points shown is 132,368 fCi–days per cubic meter air.

Cumulative intake based on integration of daily measurements:
132,368 fCi-days $m^{-3} \times 22.8\ m^3\ day^{-1} \times 10^{-6}$ nCi per fCi =

3.0 nCi

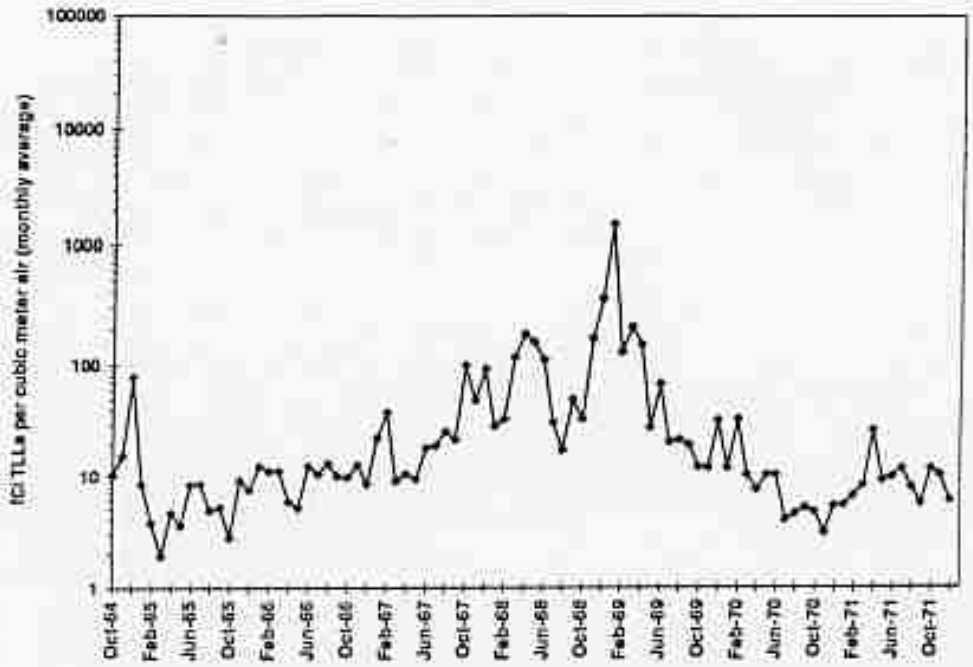

Figure 2. Monthly averages of daily measurements of total long-lived alpha activity in air at the S-8 sampler near the 903 area. The integrated air concentration from summing the points shown is 4342 fCi–months per cubic meter air.

Cumulative intake based on integration of monthly averages (Figure 2):
4342 fCi-mo m^{-3} × 22.8 m^3 day^{-1} × 30.4 days mo^{-1} × 10^{-6} nCi per fCi =

3.0 nCi

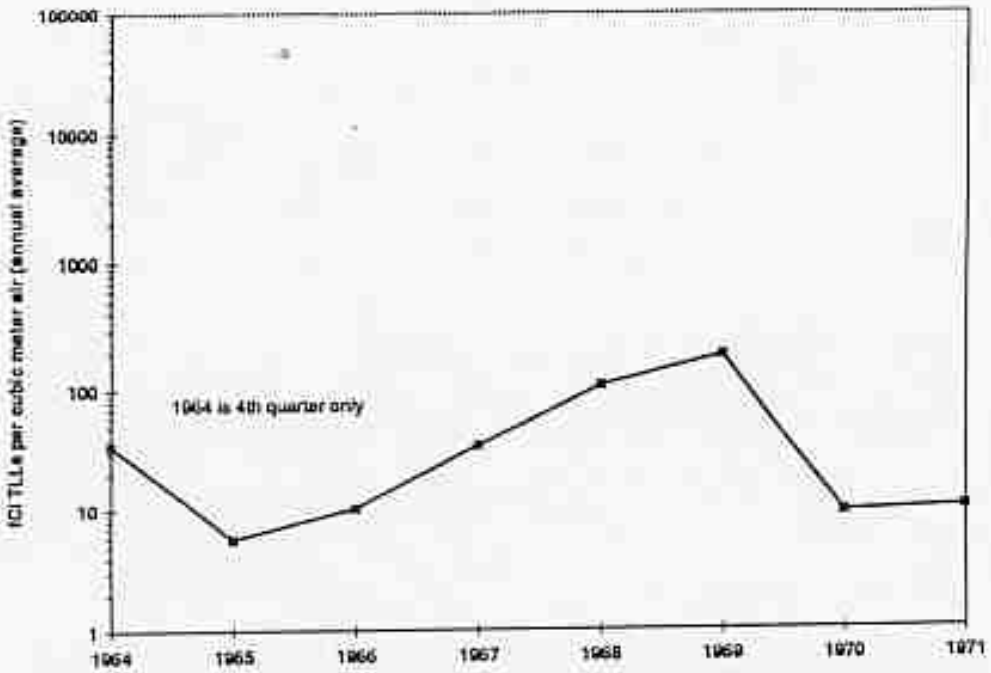

Figure 3. Annual averages of monthly averages of total long-lived alpha activity in air at the S-8 sampler near the 903 area. The integrated air concentration from summing the points shown is 362 fCi-years per cubic meter air.

Cumulative intake based on integration of annual averages (Figure 3):
362 fCi·yr m^{-3} × 22.8 m^3 day^{-1} × 365 days yr^{-1} × 10^{-6} nCi per fCi =

3.0 nCi

Conclusions

This example calculation illustrates that even though figures 1-3 appear quite different, *the averaged data produce the same result as the daily measurements, when used to compute what a person would have inhaled.*

Analysis of the daily data is the best approach to understanding the mechanics of the release phenomena for the 903 area. However, we will be computing and using averages for some purposes, like comparing one location to another or illustrating long-term trends.

The more important issue facing us is actually not using averages for some purposes, but rather identifying how an average is computed, when we are unable to locate all the original data. There are some important considerations, such as treatment of less-than values. For much of its early history, the plant-reported averages for alpha activity in air during 1970-71 (and probably for other years as well) using an MDA of 0.21 cpm for any

daily count which was 0.21 cpm or less. Considering that the mode of these data is zero, that is, there is quite frequently no alpha activity on the filter above the counter background, this procedure introduced a considerable positive bias. Our computed averages, using the true net value (but not less than zero) were consistently less than the averages reported by Dow in their monthly environmental information summaries for 1970–71. However, this is not always the case for other times; and the reasons for differences in our reconstructed averages with those previously reported is still under investigation.

There are other problems with using previously reported averages. Location groups are often combined (e.g. all offsite samplers), so that individual station results can not be examined. We have noted that averages were sometimes reported as a "less-than" concentration, even though only a small percentage of the individual measurements were less-than detectable. This was common for total long-lived alpha in offsite air. For example, a set of measurements might be: 10, 9, 7, 9, 5, 12, and <4. The average of this set of data would be reported as "< 8", even though only one value was not detectable. Obviously it is preferable for us to locate and use the original measurement data whenever possible. Unfortunately, this has not been possible for quite a large number of years of certain types of data.

We must remember that the Dow's purpose for conducting air monitoring was to demonstrate compliance with standards and to indicate gross contamination problems. Thus, some conservatism (positive bias) was not necessarily a bad practice for them. However, when we choose to use the data for other purposes, we must be careful to investigate the details. We may not be able to use the data as fully as we might like if the original data are not located.

THE ROCKY FLATS NUCLEAR WEAPONS PLANT DOSE RECONSTRUCTION AND RISK CHARACTERIZATION PROJECT

PHASE II: Toxicity Assessment and Risk Characterization

Terrol F. Winsor
April, 1996

DOCUMENT REVIEW: Status and Projections

INTRODUCTION

During its analysis of information sources for the Rocky Flats Dose Reconstruction Project, the Radiological Assessments Corporation (RAC) team has examined thousands of documents. Access to these documents has been obtained via a great number of mechanisms, and they reside in areas from formal repositories to the libraries of individuals. During the September, 1994 Health Advisory Panel meetings, RAC presented a status report of document review. That report addressed document review having to do with the following:

1. Documents stored at DOE Headquarters in Washington, DC
2. Documents stored at EG&G, Idaho
3. Rocky Flats and Albuquerque Operations Office records seized by the FBI
4. Building 881 classified documents, at Rocky Flats
5. Building 706 Classified Library vault documents, at Rocky Flats
6. Other Rocky Flats classified documents stored at 7 small Rocky Flats repositories.
7. Chemrisk Offices in California
8. Chemrisk, Doty & Associates and EG&G databases at Rocky Flats
9. Environmental Master File at Rocky Flats
10. Federal Records Center at the Denver Federal Center
11. Rocky FLats Public Reading Room at Front Range Community College
12. Legal and Environmental Database at Rocky Flats
13. Effluent monitoring records held at EG&G East Pearl offices in Boulder
14. Records, research papers and verbal leads to records provided by other sources. This last category comprises a grouping too large for listing here, and, in fact, represents some individuals who desire anonymity.

RECENT RECORDS REVIEW

Since September, 1994, RAC has completed review of documents pertaining to the above-listed repositories and categories. Of special interest is the review of files held in the Denver offices of the U.S. Attorney (Grand Jury Files) and the DOE. These records were obtained under Colorado Department of Public Health and Environment Freedom of Information Act requests. We have also examined the Church Lawsuit Settlement, but do not yet have access to the Grand Jury Report. Other repositories visited include the Western History Library at the University of Colorado; and the National Air and Radiation Environmental Laboratory of the EPA at Montgomery, Alabama.

Finally, other sources of documents, which have been examined, include scattered records held at the Rocky Flats offices of the Environmental Analysis Laboratories and Environmental Restoration. The Interlocken Library at Broomfield EG&G offices has also been perused.

CONCLUSIONS AND PROJECTIONS

The work of examining large numbers of documents in formal repositories is essentially complete. There are no plans to return to these sources of information unless a compelling argument can be made that a useful document, whose location is known, has been overlooked. Doubtless, additional items of interest will be brought to our attention from time-to-time. These latter should be considered on an individual case basis.

INTERVIEWS: Status and Projections

INTRODUCTION

As part of its analysis of information sources for the Rocky Flats Dose Reconstruction project, RAC team members have talked to hundreds of people. Many of these have supplied extremely useful additional information on topics such as work at the 903 oil barrel storage area in the late 1960's. Often, it has been necessary to contact up to 20 persons for information on a particular topic such as weather during the 1957 or 1969 fires. Some people have been interviewed more than once. The focus of these interviews was usually to trace or identify process and monitoring data from early years of operation. We have frequently used these interviews in search of leads to previously unnoticed or unremarked environmental releases.

A great many sources have provided information on past and present monitoring, and research activities; as well as insight on offsite impacts and internal workings of the Rocky Flats Plant (RFP). The following list denotes some of those who have helped in this search for information:

1. Current RFP employees
2. Past RFP employees
3. Non-affiliated scientific researchers of RFP questions
4. Interested citizens
5. Citizen groups such as the Environmental Information Network
6. City and County Health/Science personnel
7. Colorado Department of Public Health and Environment personnel
8. Citizens Environmental Sampling Committee members
9. Support/Discussion groups of former Rocky Flats Employees
10. Retired members of the United Steelworkers of America Union
11. Members of a health support group of former RFP employees

In August, 1994, the RFP DOE manager released a statement in support of the Dose Reconstruction Project, and called on workers to feel free about providing interviews for this project. The DOE statement also provided access to a number of former RFP employees.

The following topics were most often discussed with interviewees who had been employed at RFP, or knowledgeable citizens:

1. 903 oil barrel storage area
2. 1957 fire and weather conditions
3. 1969 fire and weather conditions
4. Radionuclides in soils, and resuspension
5. Beryllium
6. Worker health and safety, especially as regards chemicals and beryllium
7. Archived environmental media
8. Radionuclides in water
9. Sources of important documents, especially those that have disappeared
10. Proposed additional research or monitoring

In addition to these most frequently discussed items, we also have obtained information about dioxins, environmental contaminants released from sources near the RFP, and locations of environmental sampling not previously well documented.

PROSPECTS FOR ADDITIONAL INTERVIEWS

Very often, as the project progresses, we discover new names of potential interviewees who had not been contacted previously. Also, we may learn of the need to talk to additional people as we gain a better understanding of gaps in our knowledge. Furthermore, we may not have had the opportunity to interview some who were considered to be important from the very beginning.

We have identified needs that remain to be addressed through the interview process. The listing of greatest interest is below.

1. 1957 fire-there remain four people who, we believe, could provide important information. At least one of them has previously refused an interview, and one of the others is currently considering an interview. We believe at least two may meet with us.

2. At the conclusion of Phase I, Chemrisk suggested followup talks with several people they had interviewed. We have talked again to four of these, while four others remain to be contacted. As they have previously submitted to interview, we are encouraged they will address followup questions.

3. The Environmental Information Network requested that greater attention be given to contacting several persons who might provide information on a variety of topics, and have supplied several names. Five more individuals will be contacted, several of whom reside out of state. We were specifically requested to follow up with those who were actually on Rocky Flats Plant site during the 1957 fire. We have interviewed one of the 1957 fire veterans, and have attempted to contact two others, without success. We do not yet feel it is appropriate to release the names of these potential interviewees.

4. 903 oil barrel storage area-there remain four retirees to meet, who actually worked at the area during the barrel removal. To date, these people have not desired to discuss their experiences and insights with us, and do not wish their names released. One however, suggested that they may be persuaded to cover the topic in a group meeting. We will pursue this possibility.

There are two other individuals who may have knowledge of the activities at the 903 area.

CONCLUSIONS AND PROJECTIONS:
NEED TO COMPLETE AND CLOSE THE INTERVIEW PROCESS

The interview process has proved to be most valuable and informative. An attempt to conduct the interviews listed above must now be pursued in a diligent and timely manner so that additional information may provide a substantive contribution to the overall project. Radiological Assessments Corporation believes that the above interview efforts should be and can be made in the next four months. If some of the groups or individuals refuse to discuss these topics, or remain unavailable for other reasons, we will consider that further effort is unwarranted.

Keystone Scientific, Inc.

April 1, 1996

To: ***RAC*** **Team**

From: Kathleen Meyer

Re: Follow-up on documents in boxes from unknown origin

I followed up on the memorandum of Terrol Winsor (March 28, 1996) regarding two boxes of documents containing 1969 fire records alleged to have been left by unknown person, perhaps a retiree or someone taking voluntary separation from the site. The boxes had been turned over to Dick Kell, Head of Health Physics for Kaiser-Hill. He had passed the boxes on Steve Barker (966 2452) in Radiation Health. On Wednesday, March 27, 1996 I called Dick Kell and left a phone message with his secretary that I wanted to review these documents as soon as possible. I have not heard back from him. On the same day, I called Steve Barker (966 2452) who told me that the documents had been sent to Arthur Light (966 8450), Head of Radiation Records at Rocky Flats.

When I called Mr. Light, he informed me that the documents had been transferred to fireproof, locked file cabinets under his control in Building 123. He told me that the two boxes had been reviewed by classification officers, and that no classified material had been identified. The documents have not been separated in any way. Only a brief list of the general contents of the boxes was compiled.

I arranged to review the documents on Friday March 29, 1996. Mr. Light provided me with the brief inventory of these records that he had prepared (attached). He said that the appropriate building managers would be contacted and that records related to their area would be sent to them upon request. All other records will be processed and sent on to the Federal Records Center in Denver.

The documents are of two main types.

- The great majority are Health Physics Incident or Personnel Exposure records in three-ring binders, dated in the 1970s and 1980s. I verified these records by randomly paging through them. They contain individuals' names, a short description of the incident and a body diagram to locate the injury. The incidents were not only radiation-related but included all types of situations.
- Six handwritten logbooks, each identified by a person's name on the front or inside cover. The dates of the notebooks ranged from 1963 through 1985. The notes were routine laboratory or shift supervisors' comments. The "zephyrs" logbook was divided into sections: zoo, golf, grand prix, west side story, hams, but little other information was included. From my inspection, all logbooks appeared intact and no pages had been removed.

I closely reviewed the logbooks from the time of the 1969 fire. The information in the logs tended to be brief and did not fully describe all of the events surrounding the fire, the subsequent clean-up, or the 903 area clean-up. Some examples are:
Vogel/“Rabbit” (green cover)--”

- p. 71 5/12/69 “Lewis changing offsite air samplers”
- p. 72 5/13/69 “Sent offsite and onsite air sample results to 23”
- p. 77 5/29/69 “Atherton mentioned his suspicion of Pu blowing from 903 area and exposing 86 people”

Although the books did not seem to contain quantitative information that might be useful to dose reconstruction, I did request copies of some of the pages for general *RAC* team review (see attached letter). When I receive these pages I will pass them along to those who are interested.

copy: Normie Morin, CDPHE

R.E.K. BOXED DOCUMENT DISPOSITION SCHEDULE

Inventory:

Drawer 3, Cabinet 0001130
Incident Reports/Radiation Monitoring Reports
- 3-Ring Binder - 371/374
- 3-Ring Binder - 707 "1987 to "
- 3-Ring Binder - 707 "1976 to 1986"
- 3-Ring Binder - 774
- 3-Ring Binder - "1981 January to July"
- Loose in mailer envelope
- Loose as a bunch

Drawer 4, Cabinet 0001130
Incident Reports/Radiation Monitoring Reports
- 3-Ring Binder - 771 "1974 - 1981"
- 3-Ring Binder - 779
- 3-Ring Binder - 707 "Area"
- 3-Ring Binder - 776/777
- 3-Ring Binder - "All Bldgs. January to June 1988"
- 3-Ring Binder - "Non-Pu"
- 3-Ring Binder - 771 "1982 - 1986"

- Notebook (Log) - Dick DelPizzo (black cover) (5-28-81 to 3-18-85)
- Notebook (Log) - "Zephars" (blue cover) (Sections designated, no date)
- Notebook (Log) - R. G. DelPizzo (green cover) (Bldg 771 - Rm 164 (2b)
- ✓ Notebook (Log) - "Kittinger's Log Book No. IV" (1-2-69 to 3-28-72)
- ✓ Notebook (Log) - W. D. Kittinger/ "6-20-63 thru 10-27-67" R.M. Vogel
- ✓ Notebook (Log) - "Rabbit" (green cover) R.M. Vogel (10-30-67 to 7-30-

Disposition Schedule:
January 8, 1996 - Begin report record preparation for archiving.

Sort and collate Incident/Monitoring Reports by binder. Remove Staples (as necessary) and sequentially number pages per requirements. Photocopy reports with pencil and non-standard pen markings for actual record use.

Notify Building Managers of Log Books for their internal review.

Keystone Scientific, Inc.

April 18, 1996

To: *RAC* Team

From: Kathleen R. Meyer

Subject: Review of boxes of indices of microfilm documents at RFP

These 4 boxes of records had been reviewed previously by Paul on March 6-7, 1996. I did a follow-up review on April 15, 1996. My review confirms the types of records that Paul reported earlier. Most of these records have permanent record retention in the Building 881 vault, an area where we previously did a systematic review of all records. In general, these types of records are not directly useful for our dose reconstruction project. Following are a sample of the types of records that I reviewed.

Box 1

- TE (Tool Engineering Dept.) 1970, 1971, 1972
  Drawing No., Size, Sheet #, Classification.
- Omnibus Environmental Assessment for the RFP of the USASC July 1, 1974, Dow Chemical
- Shipping Records/FEDEX Tally Records, Bills of Lading
- TW--Waste Records early 1970s to mid-1980s
  Radioactive Waste Certification Procedures
  Radioactive Waste Operations Procedures
- Waste Materials Management #1
  Nonsalvable disposal records
  Nonline Generation Bldg. 721
  March 1964-January 1970
  (ID#, gross wt, net wt, gamma ct, date packaged, contents, dry box #, AEC inventory #, radio film #, amount of Pu discarded, method of determining ava supv. signature, muf rep. sign., date shipped)
- U.S. Patent Applications 1972, 1973
- Waste Operations--Radioactive Waste Records (April 20, 1964, Bldg. 881
  (W.D. #, Drum #, gross wt, net wt, H. P.--date, person, survey, cpm, type, remarks)
- J. B. Owen, June 25, 1969. Plant to construct barrier, Bldg. 726. Memo to H. E. Bowman--"To construct barrier to isolate an area south of Room 443 (Radiography Vault). Barrier will serve to control spread of contamination, control the air plan, and make it possible to decontaminate the equipment and area".
- Second Report of Subcommittee 18, General Research Committee, The Dow Chemical Co. at Midland, October 12, 1960. Ed Wright, Chairman.
- 1969 Fire, Bldg. 776 (Bldg. 881 records)
- Environmental Raw Data--Landfill Effluent Analysis 8/7/76 to 3/20/78
  Pu-238; Pu-239,240, Am-241, H-3, Tlla

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- Analytical Records, Bldg. 74 Processed Waste 1962
- Waste Identification and Processing Records 1990
- Bldg. 124--Waste Treatment Plant 1990
- Ebasco Environmental, Dames & Moore, SAIC, S.M. Stolber, WASTREN, Inc., August 1990.
- Waste Stream and Residue Identification and Characterization, Building 775, Version 1.0. (Bldg. 775 is a holding tank for sanitary waste received from several buildings before it is pumped to Bldg. 995, Sewage Treatment Plant. Input and output same and consist of water from showers, toilets, drinking fountains, and air washer blowdowns.)

Box 2

- Gate logs/interior post, 1955-1985
- Personnel Radiation Folders 1955-1957, 1958-1959-1963
- Reel # MF-BEHS, 2-7
- Library Reports:
    1. Quality Engineering Reports, 197?
    2. Microfilm Records
    3. Monthly Monitoring Reports
- Site Quality Assurance Records
- Independent Verification Records
- Mass Spectroscopy Lab Reports
- Radiographic Reports 1961-1963
- Nuclear Materials Control Records
- Oxnard Facility Job History
- Plutonium Operations Resumption (POR) 1991

Box 3

- Part Certification Cards
- Test & Calibration Data
- Chemical Operations (CO)
    - Purchas Order Program
    - Calibration Data
    - Gamma Surveys
    - Ring Inspection
    - 1975-1989
- Transcripts of Radio and TV Broadcasts concerning the RFP 1977-1987
- Newspaper Clippings
- Engineering Services Index/Eng. Orders (EO)
    - Invitation Documents
    - Bid Documents
    - Labor Provisions
    - Tech. Provisions
- Plant Training Records, 1987-1990
- Facilities Engineering and Construction
    - Plant Job Order (PJO)
    - Purchase Requisitions
    - "Construction Specs for Beryllium Shop Improvements (Nozzles & Fans)" 1986
- General Laboratory, 1980s
    - Logbooks
    - Raw Data Worksheets
    - Ion chromatography Logbooks
    - Product and Environmental Analytical Reports

Holding Tank Records, 1980s
Water Analysis Reports, 1972-1973
Hydrologic Test Holes for mo, yr
Ponds 1973-1976
Tritium Log 1974-1987

- Building 776 Fire Records 1969
- Land Utilization Study

Box 4

- Plutonium Recover Option Quality Assurance (QAR)
- Verification Exercise--Cost Estimates
- Daily Air Sample Reports
  1985--707
  1981
  1989
- General Lab Worksheets 1985-1986
- Radiological Records--1980s
  Special Bioassay Samples
  Contamination Surveys
  Cold Area Survey
- Quality Assurance Records (QAR)
- Maintenance Work Orders (MWO)

copy: N. Morin, CDPHE
HAP members

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June 21, 1996

Greg K. Marsh
7700 W 61st St. # 12
Arvada, CO 80004

Dear Greg:

In an attempt to answer your questions about carbon tetrachloride being used as a fire extinguisher at the Rocky Flats Plant, I contacted several experts on firefighting with experience in the 1950s and 1960s and requested literature searches on the topic.

According to the Idaho Fire Marshall and staff at the National Fire Protection Association (NFPA) in Boston, carbon tetrachloride was used in the 1950s and 1960s as a hand held extinguisher, in 1 or 2 quart pump type extinguishers or pint size glass ampules that could be thrown at a fire. Staff at both the Underwriters Laboratories and the NFPA are of the opinion that carbon tetrachloride was used in small hand held extinguishers in the 1950 and 1960s but not as a bulk extinguisher. The use of carbon tetrachloride on fires can produce toxic phosgene gas and its use was discouraged, then prohibited, sometime before 1970. Most of the handheld extinguishers were carbon dioxide. Other dry extinguishers commonly used were sodium or potassium bicarbonate, ammonium phosphate, potassium chloride, sand or graphite based materials.

I have been unable to find any reference to carbon tetrachloride being used as an extinguisher or component of firefighting materials used at the Rocky Flats Plant. Documents I reviewed from the 1950s reported that carbon dioxide extinguishers were used on glovebox and other small fires. Carbon tetrachloride was not recommended for use on plutonium fires because it reacts with burning or hot plutonium. Sand, asbestos blankets and carbon dioxide, and in later years, water, were used for these fires. Both of the major building fires that occurred in 1957 and 1969, originated in plutonium processing gloveboxes and carbon tetrachloride was not used on these fires.

I believe that compared to the volumes used for cleaning and degreasing, the volumes which may have been used to fight fires would have made up a very small percentage of the carbon tetrachloride used on site. If chlorinated firefighting

materials were ordered and inventoried in the same way as other solvents, then the amounts are accounted for when the assumption is made that the entire inventory was released to the atmosphere.

References which may be of interest include:

Author unknown. Appendix H-2, Ignition and Burning Characteristics of Plutonium. EG&G 1601347. 1969.

Author unknown. Appendix J-1, Five Serious Accident Bulletins. EG&G 1601359. 1955.

Author unknown. Description of Accident - 6/12/64 Fire EG&G-1700362. 1964.

Brook EL and Cornelison WR. Report of a Fire - V.F. Eminger Lt. - Fire Department. Fire in Building 71 Room 180 - September 11, 1957.

Domning WE and Woodard RW. Glovebox Fire Tests. Dow Chemical Company, Rocky Flats Division, Golden, CO. EMF- 1005107. 1970.

Emergency Handling of Radioactive and Metallic Fires: A Handbook for Fire Departments. Colorado Department of Health. RI- 17276. EMF-00006715. 1972.

The Fire Protection Handbook

Hammond WE, et al. Report of Investigation of a Fire in Building 76-77 on October 15, 1966. EG&G 1700363. 1965.

Thank You, Patricia D McGavran

Patricia D. McGavran, Ph.D., D.A.B.T., Consultant to ***Radiological Assessments Corporation***

cc: Normie Morin, CDPH&E
RAC

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June 26, 1996

Paula Elofson-Gardine
Environmental Information Network
P.O. Box 280087
Lakewood, CO 80228

Dear Paula:

I appreciated the suggestion you made at the February HAP meeting that we review retention pond sediment sampling data for carbon tetrachloride analysis results.

Carbon tetrachloride levels did not exceed the detection limit in sediments from holding ponds sampled as a part of the RCRA Facility Investigations/Remedial Investigations of Operable Units 5 and 6. Appendix A of the Operable Unit 5 report includes a summary of historical data and recently-collected bottom sediment sample data for pond sediments. I have been unable to find other previously conducted sediment studies which included carbon tetrachloride as an analyte.

Also at your suggestion, I talked with George Setlock who has authored reports on volatile organic chemicals (for example: *Volatile Organic Compounds in Rocky Flats Waters*, written in 1985). He could not recall any positive carbon tetrachloride sediment or water sampling data.

Thank You,

Patricia D. McGavran

Patricia D. McGavran, Ph.D., D.A.B.T., Consultant to ***Radiological Assessments Corporation***

cc: Norma Morin, CDPH&E
RAC